WHAT IS CLAIMED IS

1. A power converter for supplying power to a resonant load, comprising:

a single stage resonant energy transfer and PFC circuit for delivering power to the load while maintaining a high power factor;

an energy storage device selectively coupled to an input of the power converter and the load for selectively storing input energy and supplying energy to the load; and

the resonant energy transfer and PFC circuit being operable to draw a sinusoidal input current substantially in phase with an input voltage to obtain the high power factor.

2. The power converter of claim 1, wherein the energy storage device is a capacitor.

3. The power converter according to claim 1, wherein the single stage resonant power converter and PFC circuit is composed of three switches.

4. The power converter of claim 3, wherein two of the switches are arranged in a switching half-bridge across an input to the power converter.

5. The power converter according to claim 4, further comprising a switch connected between the switching half-bridge and the energy storage device.

6. The power converter according to claim 1, further comprising a single inductor.

7. The power converter according to claim 6, wherein the inductor is coupled between the switching half-bridge and the load.

8. The power converter according to claim 3, wherein the switches are operable to supply constant power to the load.

9. The power converter according to claim 1, wherein the sesonant load comprises a fluorescent lamp.

10. A power converter circuit for use with a rectified line input, comprising:

a switching half-bridge coupled to the rectified line input for drawing a sinusoidal current from the rectified line input in phase with an input voltage;

a shunt switch coupled to the half-bridge for shunting current to or from the switching half-bridge; and

an energy storage device coupled to the shunt switch for storing or releasing energy related to current shunted by the shunt switch.

11. The power converter according to claim 10, wherein the energy storage device is a capacitor.

12. The power converter according to claim 10, further comprising a resonant output stage coupled to the switching half-bridge.

13. The power converter according to claim 12, wherein the resonant output stage further comprises a lamp.

14. The power converter according to claim 10, further comprising a piezoelectric transformer coupled to the switching half-bridge.

15. The power converter according to claim 14, further comprising a resistive load coupled to the piezoelectric transformer, thereby forming an AC-to-DC converter.

16. The power converter according to claim 10, wherein the half-bridge and shunt switches are operable to achieve constant load power.

17. The power converter according to claim 16, wherein the half-bridge and shunt switches are operable to achieve constant load power in accordance with the following equations:

Switch	$\beta \geq 0$	$\beta < 0$
M1	From β to α_2	From 0 to α_1
M2	From 180 to β	From α_1 to 180
M3	From α_2 to 180	From 180 to 360

where

$\alpha = \alpha_1$ when $\beta < 0$, or, $\alpha = \alpha_2$ when $\beta \geq 0$ (4)

$$\alpha_1 = \frac{360}{2\pi}\left\{\arccos\left(\frac{-2 \cdot \pi \cdot P_{in}}{V_{in} \cdot i_{load}} + 1\right)\right\} \quad (5)$$

$$\alpha_2 = \frac{360}{2\pi}\left\{\arccos\left(-2\cdot\pi\cdot\left|\frac{P_{in}}{V_{in}\cdot i_{load}}\right| + \cos\left(\beta\cdot\left(\frac{2\cdot\pi}{360}\right)\right)\right)\right\} \quad (6)$$

$$\beta = \frac{360}{2\pi}\left\{\arccos\left(-2\cdot\pi\cdot\left|\frac{P_{Cbus}}{V_{Cbus}\cdot i_{load}}\right| + 1\right)\right\}\cdot sign\left(\frac{P_{Cbus}}{V_{Cbus}\cdot i_{load}}\right) \quad (7)$$

where

M1 and M2 represent high and low half-bridge switches, respectively;

M3 represents the shunt switch;

α, α_1, α_2 and β represent conduction angles during which periods of time the relevant switches are on;

Pin represents input power;

Vin represents input voltage;

iload represents load current;

Pcbus represents energy storage device power; and

Vcbus represents energy storage device voltage.

18. A method for operating a power converter circuit composed of a switching half-bridge coupled to a power converter input and a shunt switch coupled to the half-bridge and an energy storage device, comprising:

switching the half-bridge and shunt switches to achieve constant power delivered to a load; and

switching the half-bridge and shunt switches to draw sinusoidal current from the power converter input in phase with an input voltage to thereby achieve a high power factor.

19. The method according to claim 18, further comprising operating the half-bridge and shunt switches according to the following equations:

Switch	$\beta \geq 0$	$\beta < 0$
M1	From β to α_2	From 0 to α_1
M2	From 180 to β	From α_1 to 180
M3	From α_2 to 180	From 180 to 360

where

$\alpha = \alpha_1$ when $\beta < 0$, or, $\alpha = \alpha_2$ when $\beta \geq 0$ (4)

$$\alpha_1 = \frac{360}{2\pi}\left\{\arccos\left(\frac{-2\cdot\pi\cdot P_{in}}{V_{in}\cdot i_{load}}+1\right)\right\} \quad (5)$$

$$\alpha_2 = \frac{360}{2\pi}\left\{\arccos\left(-2\cdot\pi\cdot\left|\frac{P_{in}}{V_{in}\cdot i_{load}}\right|+\cos\left(\beta\cdot\left(\frac{2\cdot\pi}{360}\right)\right)\right)\right\} \quad (6)$$

$$\beta = \frac{360}{2\pi}\left\{\arccos\left(-2\cdot\pi\cdot\left|\frac{P_{Cbus}}{V_{Cbus}\cdot i_{load}}\right|+1\right)\right\}\cdot sign\left(\frac{P_{Cbus}}{V_{Cbus}\cdot i_{load}}\right) \quad (7)$$

where

M1 and M2 represent high and low half-bridge switches, respectively;

M3 represents the shunt switch;

α, α_1, α_2 and β represent conduction angles during which periods of time the relevant switches are on;

Pin represents input power;

Vin represents input voltage;

iload represents load current;

Pcbus represents energy storage device power; and

Vcbus represents energy storage device voltage.

20. The method according to claim 18, further comprising switching a switch in the half-bridge to supply current to the load and draw a sinusoidal current from the input to achieve high power factor.

21. The method according to claim 18, further comprising switching a switch in the half-bridge to obtain a recirculation path for load current.

22. The method according to claim 18, further comprising switching the shunt switch to transfer energy between the energy storage device, the input and the load.

23. The electronic ballast according to claim 3, wherein the switches are MOSFETs.

24. The power converter according to claim 10, wherein the switches are MOSFETs.